

**KITTITAS VALLEY WIND POWER PROJECT**

**CLARIFICATION INFORMATION  
PROVIDED TO EFSEC  
INDEPENDENT CONSULTANT  
FOR EIS PREPARATION**

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***Sections 1.3.1.1, Commercial General Liability Insurance and 1.3.2 Environmental Impairment***

Zilkha Renewable Energy's Commercial Liability Coverage is \$1 million for general liability and \$4 million umbrella coverage. As of May 5<sup>th</sup>, 2003 the umbrella coverage was increased to \$9 million.

***Section 2.3.1.2, Overview***

Throughout the Applicant's ASC, 181.5MW has been noted as this represents the most likely total nameplate capacity for the Project and 121 x 1.5MW Wind Turbine Generators has been noted as the most likely technology for the Project. However, the final selection of the exact type and exact size of wind turbine to be used for the Project depends on a number of factors including the equipment availability at the time of construction (Section 2.3.12 in the ASC). The Project will utilize 3-bladed wind turbines on tubular steel towers within the range of 1.3 MW to 3 MW (generator nameplate capacity). The range of dimensions of the various turbine models under consideration for the Project is presented in Figure 2.3.6-1 in the ASC. The number of turbines and the resulting nameplate capacity of the Project will depend on the type of technology used.

The largest wind turbine contemplated for the Project has a 90 meter (295 foot) rotor diameter on an 80 meter tall (262 foot) tower for an overall height of 410 feet. This turbine originally was configured with a 2.5 Megawatt (MW) generator and it has since been announced that the turbine is configured with a 3 MW generator. Using this turbine for the Project would result in a site layout with up to 82 units and a Project nameplate capacity of up to 246 MW.

In the event turbines with a smaller rotor diameter and smaller nameplate capacity are selected, the total number of turbines will be higher, i.e. for turbines with a nameplate capacity of 1.3 MW each, up 150 turbines would be used, resulting in a Project total nameplate capacity of 195MW. In the event that turbines with a larger rotor diameter are used, the total number of turbines would be lower, i.e. for turbines with a nameplate capacity of 3 MW, up to 82 turbines would be used, resulting in nameplate capacity of 246 MW. Based on current pricing and performance for wind turbine technology presently on the market, the most likely scenario is 121 turbines of 1.5 MW nameplate capacity each, for a total of 181.5 MW. This is explained in Sections 2.3.6, p. 7 and 2.3.12, pp. 14-15 of the ASC. Rather than restate this possible range and all the accompanying details at every point in the ASC where the number, size or capacity of turbines proposed for the Project are referenced, the Applicant has used the most likely scenario of 121 units of 1.5MW wind turbine generators.

#### ***Section 2.3.4, Electrical Collection System Infrastructure***

The electrical collection system will also include junction boxes and pad mounted switchgear panels which will be installed to connect cables together coming from different directions and allow for the isolation of particular strings of turbines. In total, it is anticipated that about 15 junction boxes and 10 switch panels will be required for the electrical collection system.

##### ***Junction Boxes***

The junction boxes are either steel clad or fiberglass panels, mounted on pad foundations with dimensions of roughly 4 feet wide X 6 feet long X 6 feet high. The pad foundation also has an underground vault about 3 feet deep where the underground cables come in. The junction boxes will also have a buried grounding ring with grounding rods tied to the collection system and a common neutral.

##### ***Switch Panels***

The switch panels are steel clad enclosures, mounted on pad foundations with dimensions of roughly 7 feet wide X 7 feet long X 5 feet high. The switches allow for the de-energization or isolation of particular collector lines and strings of turbines. This isolation allows for maintenance and repair of the collection system if and as needed without de-energizing the entire Project. The pad foundation also has an underground vault about 3 feet deep where the underground cables come in. The switch panels will also have a buried grounding ring with grounding rods tied to the collection system and a common neutral.

#### ***Section 2.3.6, Wind Turbine Generators and Towers***

Section 2.3.6.1.11 of the Applicant's ASC erroneously references a requirement for an earthing system with ground resistance of 2 Ohms or less. The wind turbine manufacturers' standards generally require that a maximum of 10 Ohms of ground resistance at each turbine be achieved. In order to achieve this level of grounding and to ensure that the overall Project grounding system is robust, a number of provisions are engineered into the Project's grounding system and the electrical system design.

The buried grounding ring of bare copper around each wind turbine with 4 grounding rods is connected to the tower base and also to an additional grounding ring with 1-2 grounding rods which is buried around the base of the adjacent pad transformer. The pad transformers are generally a grounded "Wye" type unit. The neutral of each pad transformer is connected to the grounding rings. If the soil is too rocky for the grounding rods, a hole is drilled, the rod is placed in the hole and it is filled with a designated bentonite mix to ensure a surrounding ground contact.

The underground 34.5 kV cables will all have a concentric neutral conductor shielding or will be buried with a bare copper wire lying in the trench to act as the grounded neutral. The neutrals on the cable runs are terminated to the ground terminal at each pad transformer and, pursuant to National Electric Code (NEC) requirements, are tied to buried grounding rods at every ¼ mile. Additionally, at the, junction boxes, pad switches and at the substation, the underground cable neutrals are tied to the common grounding system. In effect, the grounding system ties the tips of the blades of each turbine all back to an extensive grounding network all the way back to the substation grounding grid. As stated in section 2.14.3.1.1 of the ASC, the detailed geotechnical investigation performed prior to final design will include testing to measure the soil's electrical and insulative properties to ensure that the grounding system and electrical design are adequate.

### ***Section 2.3.8, Meteorological Monitoring Station Towers***

All meteorological (met) monitoring towers (discussed in Section 2.3.8 of the ASC) are installed with a grounding system that protects the meteorological sensors and loggers from electrostatic discharge (ESD) and provides lightning protection to the tower by bringing the tower and everything mounted on it to ground potential. Lightning dissipaters or rods are installed at the top of the towers to provide an umbrella of protection for the upper sensors.

### ***Section 2.3.12, Turbine Site Layout Variances and Exhibit 1 (Project Site Layout)***

The minimum setback distances incorporated into the proposed Project layout are based on several factors, including safety, avoidance of nuisance concerns, industry standards and Applicant's own experience operating wind power Projects. Some are fixed distances (i.e. 1,000 feet) that are based on modeling of potential nuisance impacts such as noise and shadow flicker. Others, such as "tip height" are related to the size of the actual turbines to be installed (see ASC Figure 2.3.6-1). Tip height refers to the total distance from the base of the turbine to the tip of the blade at its highest point. Tip height setbacks are primarily safety-related, e.g. in the event of a massive earthquake combined with a hurricane force wind, if the entire tower and turbine were to collapse, they would not fall on a public road or a neighbor's property.

The setbacks that are proposed are as follows:

- Setback from residences of neighboring (i.e. those without signed agreements with the Applicant) landowners: 1,000 feet
- Setbacks from residences with signed agreements with Applicant: At least blade tip height. However, it may be greater based on the property owner's approval. Some landowners want to have turbines closer than 1,000 feet to their residence in exchange for more turbines on their land and the revenue generated by them.

- Setback from property lines of neighboring landowners: 50 feet beyond the tip of the blade at its closest point to the property line.
- Setback from County/State roads: Turbine tip height
- Setback from property lines of landowners with signed agreements with Applicant: None. All property owners with signed agreements with the Applicant have agreed to a zero setback from property lines, as this allows the most efficient and lowest impact placement of wind turbines across various landowners.
- Setback from BPA/PSE transmission lines: Blade tip height.

In the event that the final turbine selected for the Project is larger or smaller than the scenario presented in the ASC, minor adjustments will be made to the proposed Project layout to maintain the setbacks described above.

#### ***Section 2.4.6, Step-Up Transformers.***

The oil containment system is designed to adequately deal with heavy rain combined with a loss of oil incident. The substation design will incorporate an oil containment system consisting of a perimeter containment trough, large enough to contain the full volume of transformer mineral oil with a margin of safety, surrounding the main substation transformers. The trough will be poured as part of the transformer concrete foundation or will consist of a heavy oil resistant membrane which is buried around the perimeter of the transformer foundation. The trough and/or membrane will drain into a common collection sump area which will be equipped with a sump pump designed to pump rain water out of the trough to a nearby natural drainage. In order to prevent the sump from pumping oil out to the surrounding area, it will be fitted with an oil detection shut-off sensor which will shut off the sump when oil is detected. A fail-safe system with redundancy is built to the sump controls since the transformers are also equipped with oil level sensors. If the oil level inside a transformer drops due to a leak in the transformer tank, it will also shut off the sump pump system to prevent it from pumping oil and an alarm will be activated at the substation and into the main Project control (SCADA) system.

Similar to the substation transformers, the pad mount transformers at each wind turbine are also equipped with oil level indicators. Since the amounts of oil contained in the pad mount transformers is relatively small, tank breaches are very rare, they are filled with mineral oil, and the turbines are not installed near any waterways or delineated wetlands, no special provisions are anticipated for oil contamination at each unit. The quantity of oil listed in the ASC (500 gallons for the pad mounts and 12,000 gallons for the substation transformer) represents the anticipated highest amount of oil each transformer would contain if it is the largest in its size range (i.e. 2.5 MVA for the pad-mount transformers and 72/96/120 MVA for the substation transformers).

#### ***Section 2.5, Water Supply***

Water will be used in the O&M facility for typical daily activities such as kitchen and bathroom use as well as grounds maintenance (e.g. watering of landscaping around the O&M facility and substation if necessary) and possibly washing of trucks. No major operational use of water is anticipated.

### ***Section 2.8, Wastewater Treatment***

Discharges to the O&M septic system would be typical of an ordinary office facility (domestic sewage, dishwashing liquid, hand soap). There will be no industrial discharges. Hydraulic and lubricating fluids as well as anti-freeze will be managed and contained so as not to discharge to the septic system. Trace amounts of oils or greases that may enter the shop floor drain will be captured by a grease trap installed between the floor drain and the septic tank so as to prevent such materials from entering the septic system. Therefore, no effects on the function and effectiveness of the septic system are anticipated.

### ***Section 2.9.2.1, Construction Spill Prevention***

Fueling of large, heavy construction equipment such as cranes and earth moving equipment will occur on site where the equipment is located. The fuel truck will drive to the equipment. Some construction vehicles, such as pick up trucks, will be fueled in town at gas stations. To avoid spills, fueling trucks will be equipped with auto shut-off valves and other safety devices. Any spills will be addressed in accordance with the construction spill prevention plan that will be developed by the construction contractor and will be submitted to EFSEC for review and approval prior to construction.

### ***Section 2.9.2.1, Construction Spill Prevention***

The construction spill prevention plan, which will be submitted to EFSEC for review and approval, will address prevention and clean up of any potential spills of hydraulic fluids from construction equipment.

Pad mounted transformers or transformers mounted in the turbine nacelles will be filled at the factory. Substation transformers will be filled at the actual substation site.

The substation transformers have a specifically designed containment system. More detail on containment systems is included in Section 2.4.6 above.

The details of how lubricating oils and other materials will be stored and contained at the construction staging area will be addressed in the construction spill prevention plan, which will be developed by the construction contractor and submitted to EFSEC prior to

construction for review and approval. Appropriate measures will be taken to ensure these materials are not spilled and that if a spill does occur, it is promptly cleaned up and reported to the proper agencies.

#### ***Section 2.9.2.3, Operations Spill Prevention***

The replacement fluids will be stored on a concrete surface inside the O&M facility and will be surrounded by a berm or trough to trap any leaks or spills. Specific details of the volumes of the containment structure(s) will be addressed in the operations spill prevention plan to be submitted to EFSEC for review and approval.

As stated in ASC Section 2.9.2.2.1, both the nacelles and the towers incorporate adequate containment to capture any fluids in the event of a leak or spill. Specific details of the volumes of the containment structure(s) will be addressed in the operations spill prevention plan to be submitted to EFSEC for review and approval.

Pad mounted transformers do not typically incorporate a containment structure, as the volume of mineral oil contained in them is much smaller than in the substation transformers and the risk of a spill is minimal. The substation transformers will be surrounded by a containment berm or trough, as dictated by the utility to which the Project is interconnected (PSE or BPA.) The trough or berm will incorporate a sump pump with a sensor to detect when the fluid entering the pump is water vs. oil that automatically shuts off when oil is detected. Specific details of the volumes of the containment structure(s) will be addressed in the operations spill prevention plan to be submitted to EFSEC for review and approval.

#### ***Section 2.10.5, Underground Cable Trenching Storm Water Pollution Control Measures***

A survey was conducted in April, 2003 by a biologist from Applicant's consultant CH2MHILL who is trained in wetland delineation to determine if any of the proposed Project facilities would impact any wetlands or intermittent streams. Detailed results of that survey including methods and findings are included as Attachment 2. The survey identified four locations where access roads and associated underground electric cables will cross intermittent streams or wetlands. All four locations are category 3 wetlands as defined by Department of Ecology. The total area impacted at all four locations is anticipated to be less than 1500 square feet. Depending on the total Project impacts and which National Wetlands Permit the COE assigns, the DOE may require compensatory mitigation for the Project. Applicant intends to develop a suitable mitigation plan that complies with DOE guidelines. It is anticipated that this wetland/riparian mitigation will be implemented in the "mitigation parcel" identified in Sections 3.4.3 and 3.4.4, which contains a substantial portion of wetland/riparian habitat that could be protected and enhanced.

### ***Section 2.10.7, Substation Construction Storm Water Pollution Prevention Measures***

The oil containment trough surrounding transformers will be large enough to contain the full volume of oil, but not combined with a 100 year rain storm. A dedicated sump pump will pump rainwater from the trough collection pit.

### ***Section 2.10.8, Final Road Grading and Site Cleanup***

During construction, the primary wastes generated will be solid construction debris such as scrap metal, cable, wire, wood pallets, plastic packaging materials and cardboard. The total volume of construction wastes is expected to be less than one hundred (100) tons. This waste will be accumulated on-site in drop boxes until hauled away, probably to the Ellensburg transfer station or the Ryegrass construction and demolition debris landfill, by either the EPC contractor or the local solid waste collection service provider, Waste Management, which has the franchise for solid waste collection service in Kittitas County.

Garbage is transferred from the transfer station in Ellensburg to the Greater Wenatchee Regional Landfill located in East Wenatchee. The Ryegrass construction and demolition debris landfill operated by Kittitas County accepts inert materials including asphalt, construction debris, fencing, roofing material, concrete, brick, etc. All of these are licensed facilities.

Most of the construction waste will be recyclable other than the film plastic and Styrofoam packaging material and food-related waste generated by the construction workforce. Specific recycling program details will be developed by the construction contractor.

Please refer to Attachment 4 for a list of materials that are accepted at the Ryegrass landfill. The only materials expected to be produced by the construction of the Project that is not accepted at the Ryegrass landfill will be cardboard and food related wastes. .

### ***Section 2.13.2.1.3, Safety Program***

The on-site safety manager and on-site construction manager will determine the amount of time that is reasonable and prudent to rectify or take action on a potential safety hazard. Generally the definition of “reasonable time” is never more than 24 hours. If a serious safety issue is identified which poses an immediate threat, the affected area will be required to be shut down immediately and remain roped off and off limits until the safety violation is rectified. If immediate action is not taken by the construction contractor(s), the construction management team will take action to immediately shut



down the area of concern. For issues relating to safety procedures, the general contractor will be given 24-48 hours (at the discretion of the on-site safety manager) to provide tailgate safety training to all involved on-site construction staff.

#### ***Section 2.14.3.2, Site Preparation and Road Construction***

Paved drainage channels across the roadways have several disadvantages compared to water bars or sunken grades which are proposed to be graded in place: 1. They tend to clog up with the road gravel and road capping rock fines; 2. They tend to wash-out along their sides, creating a gap step between the road surface and the paved barrier, hindering the access of larger vehicles with low-boy type trailers; 3. They tend not to dissipate the energy in the flowing water as it sheds from the road surface, causing it to accelerate and washout at the exit ends unless additional rock dams and silt fencing provisions are made. Water bars or sunken grades will be used to facilitate water shedding in steeper grade areas and rock dams with silt fencing or straw bales along with a re-seeding program will be used as the exit path of the water bars to prevent storm water pollution. During construction, areas with steeper grades which are prone to wash-out will be designed to shed water in one direction to a collection ditch fitted with rock dams and silt fencing or straw bales. Water bars will be graded into place once construction is complete

#### ***Section 2.15.4, Volcanic Hazards***

The protection measures listed in ASC Section 2.15 of the Application for operation will be the same as used during construction.

### ***Section 3.1, Earth Resources***

Impacts. As noted in Section 2.15, potential landslide-prone terrain is not visually apparent on the Project site and landslides are not expected to occur as a result of Project construction and operation. Therefore, impacts to local geologic resources would be limited to rock excavated during turbine foundation construction activities. With the possible exception of potential occurrences of Ellensburg blue agates, earth materials disturbed during excavation activities are not considered significant geologic resources, and therefore, impacts to local geologic resources would be negligible.

Please see Attachment 6 for a soils map.

- **Estimated depths of cuts and fills for roads, trenches, and each substation(s); maximum for the Project and typical for turbines.**

<b>Facilities</b>	<b>Estimated Permanent Footprint Area (acres)</b>		
	<b>82 WTGs</b>	<b>121 WTGs</b>	<b>150 WTGs</b>
Project Site Roadways (24-34 ft. wide)*	95	67	67
WTG and Crane Pads	5.4	8	9.9
O&M Facility with Parking	2	2	2
Overhead Line Pole Footprint	0.25	0.25	0.25
Step Up Substation	3	3	3
Turn-Around Areas	9	9	9
Meteorological Towers	0.75	0.75	0.75
<b>TOTAL FOOTPRINT (acres)</b>	<b>115</b>	<b>90</b>	<b>91.9</b>

\* For turbines larger than 1.5 MW, roads are 34 wide to accommodate for safe travel of larger cranes

- **Estimated quantities of imported and exported soils, sources of import, destination and fate of export, reasons for import or export.**

	<b>Approximate Gravel/Fill Import Requirements (cubic yards)</b>		
<b>Facilities</b>	<b>82 WTGs</b>	<b>121 WTGs</b>	<b>150 WTGs</b>
Project Site Roadway Gravel Apx. 1 ft. deep x 24-34ft. wide *	153,417	108,294	108,294
Electrical Trenching shading material, Overhead Pole backfill, Switch Panel Foundation backfill	56,397	56,397	56,397
WTG Foundation backfill	12,300	18,150	22,500
WTG and Crane Pads Apx. 30ft.X100ft. (1-2 ft. deep)	9,111	13,444	16,667
O&M Facility with Parking Gravel Apx. 2 acre X 1 ft. deep	3,227	3,227	3,227
Substation Gravel Apx. 3 acre X 1 ft. deep	4,840	4,840	4,840
Turn-Around Area Gravel 18 @ apx. .5 acre ea. 1 ft. deep	14,520	14,520	14,520
Meteorological Tower Pad Gravel Apx. 0.75 acre X 1 ft. deep	1,210	1,210	1,210
<b>TOTAL IMPORT AMOUNT (cubic yards)</b>	<b>255,022</b>	<b>220,083</b>	<b>227,655</b>

\* For turbines larger than 1.5 MW, roads are 34 wide to accommodate for safe travel of larger cranes

Approximately 50% of excavated soils are anticipated to be too large for re-use as backfill at foundations. These larger cobbles will be crushed into smaller rock for use as backfill or road material or disposed of off-site. Those materials that can not be reused on site will be disposed of in accordance with Kittitas County and Department of Ecology regulations for clean fill materials.

Imported materials will likely come from a local gravel and concrete company. There is an existing permitted quarry north of turbine F-1. The final decision will lie with the construction contractor.

There will be no concrete batch plant at the site. Concrete will be purchased from an existing plant nearby and delivered to the site in mixing trucks. BMPs, as described in Section 2.10, will be implemented to avoid or reduce impacts to water resources from runoff.

### ***Section 3.2, Air***

Attachment 15 is a wind energy rose for the Project site, generated using data from a 100 foot test tower that was in operation from 1992 to 1994. The wind rose shows the percent of time and energy in the 16 compass points. The table at the bottom of the figure also lists the mean speeds for all sixteen directions. The wind rose shows that the prevailing winds blow from the west through north-northwesterly directions. The highest wind speeds are from the west and west-northwest direction and generally occur in the spring through summer months.

### ***Section 3.3.1, Surface Water***

The Project will not generate process water and there will be no point source discharges to nearby surface waters. Operation of the Project will not require the use of any water for cooling or any other use besides the domestic well serving the limited needs of the Operations and Maintenance facility described below in Section 3.3.5. Therefore, operation of the Project is not expected to result in any discharges to surface water. Most Project facilities will be located on exposed ridge tops away from surface waters, as shown in ASC Exhibit 1, 'Project Site Layout'. The southern portion Strings A and B are within approximately one half mile of the Yakima River, and other portions of the Project are located within one half mile Dry Creek (an ephemeral creek), other unnamed ephemeral creeks, the North Branch Canal of the Kittitas Reclamation District, and livestock watering ponds. Construction of the Project could use up to 5 million gallons for dust suppression activities along roadways. Water used for dust suppression would be directly applied using tanker trucks equipped with rear end sprinkler systems and absorbed on Project access roads. Therefore, no direct or indirect discharge of water used for Project activities to area surface waters is anticipated.

However, because the Project is located within one half mile of nearby surface waters, brief descriptions of the Yakima River, Dry Creek, and the North Branch Canal are provided below.

**Yakima River.** The Yakima River descends from a water surface altitude of 2,449 feet at the foot of Keechelus Dam to 340 feet at its mouth downstream from Horn Rapids Dam near Richland. The upper reach, which drains the Kittitas Valley, is a steep gradient stream with an average streambed slope of 14 ft/mi (feet per mile) over the 74 miles from the foot of Keechelus Dam (river mile [RM] 214.5) to just upstream from Umtanum. The river can be divided into three distinct reaches on the basis of its physical characteristics. The Project is located within the vicinity of the upper reach of the river (USGS, 2002).

In the Kittitas Valley, seasonal streamflow patterns in the river can vary greatly on an annual basis due releases from irrigation reservoirs and changes in precipitation and snowmelt patterns. However, the dominant season for high streamflow occurs during the irrigation season because of the large quantity of water released from irrigation reservoirs. An example in this range in flow variation is exhibited by data from the Yakima River at Cle Elum during the 1988 to 1989 water years which shows post irrigation flow (October through December) in the river at 271 cubic feet per second (cfs). As the year progresses, the flow gradually increases to 428 cfs in the period from January through March , to 740 cfs from April through May to a high of 2,330 cfs during the irrigation period from June through September (USGS, 2000).

The three reaches of the Yakima River exhibit differences in water-quality conditions related to the differences in geologic sources of contaminants and land use. Compared with the rest of the basin, the Kittitas Valley and headwaters of the Naches River Subbasin have relatively low concentrations and loads of suspended sediment, nutrients, organic compounds, and fecal indicator bacteria. In general, these areas are considered to be areas of less-degraded water quality in the basin (USGS, 1999). However, the upper Yakima River and several of its tributaries are included in Washington's 303(d) list of impaired waters because of metals, persistent pesticides in water and fish tissue, fecal coliform bacteria, dissolved oxygen, and temperature water quality criteria violations (Ecology, 1998). It should be noted that the Washington State Department of Ecology (Ecology) is establishing a total maximum daily load (TMDL) for the upper Yakima River basin, which covers the pollution parameters of turbidity, suspended sediment and organochlorine pesticides. This TMDL will address potential impairments of beneficial uses of the upper Yakima River and its tributaries.

Dry Creek. Dry Creek in the immediate vicinity of the Project is an ephemeral creek. Because Dry Creek is an ephemeral creek, water quality data is limited. However, data collected by Ecology in 1999 in a location downstream from the Project and just upstream from the confluence with the Yakima River, shows that turbidity levels in Dry Creek are relatively low (i.e., less than 5 NTU (Nephelometric Turbidity Units)). Stream flow measurements collected by Ecology show Dry Creek flow ranged from a low of 1.5 cfs in April to a high of 19 cfs by early summer (at the beginning of the irrigation season) (Ecology, 2000).

North Branch Canal. The North Branch Canal is operated by the Kittitas Reclamation District (KRD). The canal receives its flow the Yakima River and runs 36 miles, traversing east to west across the Project Area and providing irrigation water for much of this part of the Kittitas Valley. Most irrigation occurs downhill and south of the canal and the Project Area. Flow in the canal varies during the irrigation season depending on water deliveries to irrigators. Water quality in the canal is generally good and reflects the water quality of the Yakima River. KRD regularly applies aquatic herbicides to the canal for the purpose of controlling weeds.

## REFERENCES:

Surface-Water-Quality Assessment of the Yakima River Basin, Washington: Overview of Major Findings Jennifer L. Morace, Gregory J. Fuhrer, Joseph F. Rinella, Stuart W. McKenzie, *and* Others USGS Water-Resources Investigations Report 98-4113, 119 pages, 35 figures, 32 tables)

Flow Summary of Ten Streams and Irrigation Ditches in the Upper Yakima River Basin A Component of the Upper Yakima River Suspended Sediment TMDL Christopher Evans and Art Larson Environmental Assessment Program Olympia, Washington 98504-7710 August 2000

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<http://www.elltel.net/krd/newsletter.htm>

### ***Section 3.3.2, Runoff/Absorption and Section 3.3.2.1, Construction***

The erodibility (or erosiveness) of a particular soil is a function of slope and other physical characteristics such as depth of the soil, clay content, water holding capacity, vegetative cover, etc. The USDA Natural Resource Conservation Service compiles these characteristics into a classification scheme known as an “erosivity index”. Generally, the erosivity index is available in NRCS Soil Conservation Surveys that are published for individual counties throughout the U.S. However, the only survey available for Kittitas County was published in 1945 and is currently outdated and out of print. In addition, the erosivity index was not provided in soil surveys that were published at the time that the Kittitas County soil survey was released. However, there are other indicators regarding the erodibility of soils in the Project area. These characteristics include geographic features such as slope and vegetative cover, as well as physical features of the soil, such as its drainage, runoff, and permeability index.

As noted in ASC Section 3.1.3, soils in the area are dominated by four major soil series; the Lablue, Reelow, Sketter and Reeser series. According to the Natural Resource Conservation Service (NRCS), the Lablue series is well drained, with medium runoff, and slow permeability, while the Reelow and Reeser series are both classified as well drained, with slow runoff and slow permeability. The Skeeter series is classified as well drained, with slow runoff, moderately slow permeability above the duripan (USDA, 2002a).

Even though soil permeabilities are classified as low and the runoff potential is considered high, it is anticipated that the erosivity of area soils would be mitigated by factors such as grade (i.e., the majority of soils that would be disturbed in the Project are generally located on grades of 30 percent or less) and the fact that area soils are well drained and the soil runoff index ranges from medium to slow. Therefore, it is estimated that the erosiveness of native soils immediately underlying the Project would be in the

“medium” range. In addition, it should be noted that the erosivity index pertains to in situ (i.e., undisturbed) soils. As a result, the erosiveness index is not directly applicable to soils that would be disturbed by Project construction activities, but rather, to factors such as the effectiveness of Project Best Management Practices such as storm water control procedures (discussed in ASC Section 3.3.2.1) and revegetation/reclamation measures, (discussed in ASC Section 7.3).

#### ***Section 3.3.4, Groundwater***

The operations and maintenance facility septic system will be located just below surface level. As indicated in the well logs provided as Exhibit 13 of the ASC, the wells nearest to the proposed O&M facility and septic system are from 116 to 460 feet deep. Given this depth to groundwater, the potential for the septic system drain field to infiltrate to groundwater is minimal.

#### ***Section 3.3.4.6, Impacts from Project Activities***

Applicant does not anticipate encountering groundwater during the construction of the turbine foundations. Turbines will be constructed on ridges located well above the local water table and a review of published groundwater reports and completion details for local water wells indicate that the depth to groundwater will be below the maximum depth of the excavations required for turbine foundations.

In the unlikely event that groundwater (perched or otherwise) is encountered during excavation and construction activities, and dewatering is required, the water generated during dewatering activities will be pumped into a settling basin for infiltration. As a result, it is unlikely that water generated during excavation pit dewatering would discharge to surface water sources.

#### ***Section 3.3.6, Water Use During Construction***

Water for construction will be delivered by water trucks. The construction contractor will be responsible for contracting for water delivery from an existing source. This will entail a significant number of truck trips and these trips are accounted for in the traffic estimates provided in the ASC.

#### ***Section 3.4.1.3, Existing Plant Communities***

Washington steppe vegetation closely follows Daubenmire (1970). The Central Arid Steppe zone typically contains plant communities dominated by big sagebrush (*Artemisia tridentata*), bluebunch wheatgrass (*Pseudoroegneria spicata* previously *Agropyron*

*spicatum*), and Sandberg's bluegrass (*Poa secunda*). In many areas of the zone, the introduced species cheatgrass (*Bromus tectorum*) is common due to past and present disturbance factors (Cassidy *et al.*, 1997). The higher portions of the Project area, border the Ponderosa Pine (*Pinus ponderosa*) zone.

The descriptions of generalized vegetation zones and associations are based on climax communities, which typically develop over time in the absence of anthropogenic disturbance. Within the Project area (as in most of the shrub-steppe region) many of the plant communities have been significantly modified due to numerous disturbance factors. Some of this disturbance is visible in ASC Exhibit 2, 'Aerial Photo with Project Site Layout'. Disturbance is especially pronounced in the valley bottoms and side slopes. Cattle grazing, wildfire frequency changes, introduction of exotic plant species, ground disturbance from development activities, and a host of other factors have resulted in plant communities that are kept at an early- to mid-seral stage of development. In addition, natural disturbance factors, such as lightning and mass wasting have also affected the communities. Non-native aggressive invader species are common, and often dominate the community. Within the Project area, the effects of these anthropogenic disturbances are common, although most of the communities are still dominated by native species. In many places, however, cheatgrass and bulbous bluegrass (*Poa bulbosa*) dominate the grass layer, and noxious weeds, such as diffuse knapweed (*Centaurea diffusa*), are common.

Habitat quality within the Project area ranges from 'poor' in many of the valley bottoms due to historic cattle grazing practices, to 'good' along some of the ridgetops and flats (see the legend at the bottom of ASC Table 3.4.1-1 for a description of habitat quality rating criteria).

In the habitat descriptions that follow, ratings of habitat quality are based on general observed patterns of plant community composition, amount of non-native species, and overall vegetative structure. The habitat ratings are qualitative based on general visual observations, and rely on the principal botanical investigator's extensive experience with the habitat types of the Columbia Basin.

Expected community composition was based on past experience with similar habitats, and on tables and descriptive information presented in Daubenmire (1970) and Franklin & Dyrness (1973). When all or most of the characteristic plant species that would be expected in a particular association were present (at close to expected densities), the area was considered to have 'good' community composition. The species to be expected in a particular area vary based on the plant association present. For example, good condition lithosol ridgetops would be expected to contain a very different species assemblage than a good condition riparian streambank. Conversely, where few or none of the expected characteristic species were present, the area was considered to have 'poor' community



composition. 'Poor' community composition was most often observed in areas where one or more weedy invaders had overtaken some (or all) of the native species.

The amount of non-native species in an area was based on visual estimates of non-native cover. It was necessary to take into account the overall area being evaluated, as small, dense, patches of non-native species were present in some areas. For example, in some larger areas that were relatively weed-free overall, heavy weed densities were present along the road shoulders.

Expected vegetative structure was also based on past experience with similar habitats, and on descriptive information presented in Daubenmire (1970) and Franklin & Dyrness (1973). Vegetative structure was considered 'good' when all of the expected layers were present (*e.g.* grass, low shrub, tree, etc.), and the individuals that made up each layer appeared healthy and vigorous. Assessment of vigor was based on a variety of factors which included expected plant height, number of stems, and average shrub size (depending on the species being evaluated). This evaluation was based on descriptions presented in the taxonomic references, and on investigator experience with these species throughout the region. Conversely, where some (or all) of the expected vegetative layers were missing, and/or the individuals in the community appeared weak or poorly established, the area was considered to have 'poor' vegetative structure.

The following categories to describe habitat condition were used: 'Excellent' (good community composition with negligible amounts of non-native weedy species, along with good vegetative structure); 'Good' (fair to good community composition, dominated by native plants, although with significant inclusions of non-native species in certain areas, and fair to good vegetative structure); 'Fair' (fair community composition, with non-native species dominance or co-dominance in some or all layers, and fair vegetative structure); and 'Poor' (poor community composition, dominated by non-native, weedy invaders in some or all layers, and poor vegetative structure).

The following table provides detailed estimates of the expected impacts to habitats, both temporary and permanent, by vegetation type:

Habitat Disturbance Estimates\*

VEG_TYPE	Permanent Disturbance Sq. Feet	Acres	Temporary Disturbance Sq. Feet	Acres
CF1 (Dense Conifers)	285	0.0	5280	0.1
DE (Developed)	63378	1.5	230452	5.3
GR (Grassland)	1753727	40.3	6935521	159.2
NT (Not Typed)	77516	1.8	0	0.0
RI (Riparian)	0	0.0	10	0.0
RT (Riparian Tree)	85	0.0	15735	0.4
SL (Low Sagebrush)	298196	6.8	1235514	28.4
ST1 (Dense Shrub-Steppe)	104713	2.4	260378	6.0

ST2 (Moderate Shrub-Steppe)	905576	20.8	2491065	57.2
ST3 (Sparse Shrub-Steppe)	693909	15.9	2351063	54.0
TH (Deciduous Shrub Thicket)	1455	0.0	151	0.0
<b>TOTALS</b>		<b>89.5</b>		<b>310.5</b>

\*The calculations of potential disturbance to habitats in the Project area are based on the proposed Project layout. Any changes in the final Project design will affect the actual area of impact.

#### ***Section 3.4.1.5.1, Study Area***

An additional Rare Plant Survey was performed April, 2003. The results are presented in Attachment 13, Rare Plants Memo.

The following has been added to clarify Table 3.4.1-2 in the Applicant's Application for Site Certification:

**Status<sup>1</sup>:** Washington State Status (with USFWS status in parenthesis if applicable)

**E: State Endangered.** Taxa that are in danger of becoming extinct in Washington within the near future if factors contributing to their decline continue.

**T: State Threatened.** Taxa that are likely to become endangered in Washington within the near future if factors contributing to their decline continue.

**S: State Sensitive.** Taxa that are vulnerable or declining, and could become Endangered or Threatened in Washington without active management or removal of threats.

**R1: State Review Group 1:** Taxa for which there is insufficient data to support listing in Washington as Threatened, Endangered, or Sensitive.

**R2: State Review Group 2:** Taxa for which taxonomic questions exist.

**X: State Extirpated.** Taxa possibly extirpated from Washington.

**(LE): Federal Listed Endangered:** Taxa in danger of Extinction throughout all or a significant portion of their range.

**(LT): Federal Listed Threatened:** Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.

**(PE): Federal Proposed Endangered:** Taxa proposed to be listed as Endangered (formal rulemaking in progress).

**(C): Federal Candidate:** Taxa that are candidates for formal listing as Endangered or Threatened.

**(SC): Federal Species of Concern:** Available information supports tracking the status and threats to these species because of one or more of the following factors: negative population trends have been documented; habitat is declining or threats to the habitat are known; subpopulations or closely related taxa have been documented to be declining; competition or genetic implications from introduction/stocking of exotic species; identified as a species of concern by agencies or professional societies; or in combination with any of the other criteria, information is needed on status or threats to these species.

**ID Period<sup>2</sup>:** The normal peak period during which the species is identifiable in the field.

#### ***Section 3.4.1.6.5, Potential Project Impacts to Target Plant Species***

Additional possible indirect effects on white-margined knotweed may also occur if construction of the Project alters surface and/or subsurface water flow within the populations. Because the species is restricted to vernal wet habitats, changes to the water flow regime may change the saturation/inundation patterns of these habitats, and adversely affect certain populations. However, this indirect effect to white-margined knotweed is expected to be limited or non-existent, as the Project is not expected to significantly impact surface or subsurface water flows. As a result, any impacts to white-margined knotweed populations from this factor are not expected to significantly impact the local populations or the species as a whole.

#### ***Section 3.4.1.7, Proposed Mitigation Measures***

Because noxious weeds can have numerous detrimental effects on rare plant populations, measures will be implemented to control the introduction and spread of undesirable plants during and after construction. Noxious weed control measures may include: cleaning construction vehicles prior to bringing them into the Project area from outside areas; quickly revegetating habitats temporarily disturbed during construction; and actively controlling noxious weeds that have established themselves as a result of the Project. Prior to construction, a noxious weed control plan will be developed, and the plan will be implemented over the life of the Project as mitigation.

Indirect Project-related impacts to plant species of concern may also occur as a result of changes in fire frequency patterns in the area. Project access roads can act as fire breaks, thereby decreasing the size of a wildfire. Likewise, the Project roads may allow fire crews to access small fires faster, and more effectively fight larger fires. Conversely, Project operation and maintenance activities have the potential to ignite wildfires if precautions are not taken. Because it is not clear if these effects would have a positive or negative effect on Project area rare plants, the most prudent course of action would be to implement measures to maintain existing fire frequency patterns. While certain factors are out of the control of the proponent, steps can be taken to minimize the risk of wildfire both during the construction and operation phases of the Project. Prior to construction, a

comprehensive fire control plan will be developed, and implemented Project-wide over the life of the Project. The fire control plan will take into account the dry nature of the region, and address risks on a seasonal basis.

#### ***Section 3.4.2, Wetlands***

Hunting on the private lands leased for the PProject will be at the discretion of the individual land owners, as is the case presently. It is anticipated that hunting will not be allowed on DNR lands leased for wind energy use due to liability and safety concerns. Two of the DNR sections within the Project boundary (Sections 2 and 22) do not currently have any legal public access. The other two sections (Section 16 and Section 10) have public access, but based on over a year of field observations by Applicant and consultant staff, it appears that very little hunting occurs in these areas. Transmission lines cut across Section 16, and Highway 10 cuts through Section 10. Increased animal depredation on adjacent agricultural lands as a result of the Project thus appears very unlikely. If, however, it is determined that the Project causes a significant increase in damage claims to crops or irrigated pasture in the immediate vicinity of the Project, the Applicant will either arrange for professional hunters to control the herd or reimburse WDFW for the increase in damage claims resulting from the Project.

The ProjectProject area is located within mule deer winter range, although the WDFW polygons for winter range in this area were mapped in 1990, before some expanded residential development in this area. The Project is located adjacent to elk winter range and more than three miles from mapped elk calving area and 2 miles from the Quilomene Elk Migration Corridor. The Project is not located within elk winter range (WDFW PHS polygons).

#### ***Section 3.4.3.5., Potential Wildlife Impacts***

Displacement of non-breeding birds (i.e., birds that are feeding or resting in an area or birds migrating through an area and not breeding) has been documented primarily for waterfowl, shorebirds, and waders. The one study that documented displacement of breeding birds found that primarily shorebirds were affected, especially lapwing and golden plover.

### ***Section 4.1.1, Noise***

As set forth in ASC Section 4.1.1.2 there are no federal or local noise regulations that pertain to the Project. The potential effects of noise on people are explained in ASC Section 4.1.1

Attachment 8 presents tables of ambient noise level and wind speeds collected in the Project area. Challenges of collecting noise data for wind turbine Projects are detailed below.

Wind power projects differ in many ways from conventional (gas, coal, oil) power plants. Wind power projects only generate power, and consequently noise, above a specific wind speed. A conventional power plant's noise levels can be accurately measured during calm wind conditions (10 mph but preferably less in accordance with general guidance by ANSI, FHWA and others). However, at these lower wind speeds, a wind power project would typically be very quiet; because the blades do not rotate rapidly (if at all) nor do the generators engage.

For those reasons, wind power project noise estimates and impact analyses have been based on manufacturers' noise emission data and internationally recognized noise modeling standards.

Audible noise from the high voltage transmission lines will comply with the Bonneville Power Administrations limits, namely an L<sub>50</sub> level of 50 dBA at the edge of the right-of-way (Perry, D., Bonneville Power Administration, "Sound Level Limits from BPA Facilities", BPA memorandum, May 26, 1982.)

Substation transformers and high voltage switching equipment shall be specified or designed to comply with the 70 dBA limit at all Class C EDNA (industrial/agricultural) property lines and 50 dBA at all residences (Class A EDNA).

The Applicant and Applicant's consulting team are unaware of any wind power project where ground borne vibration from an operating wind turbine has adversely impacted a residential use. Refer to Attachment 4.1B for distances between residential structures and wind turbines.

### ***Section 4.1.2, Risk of Fire or Explosion***

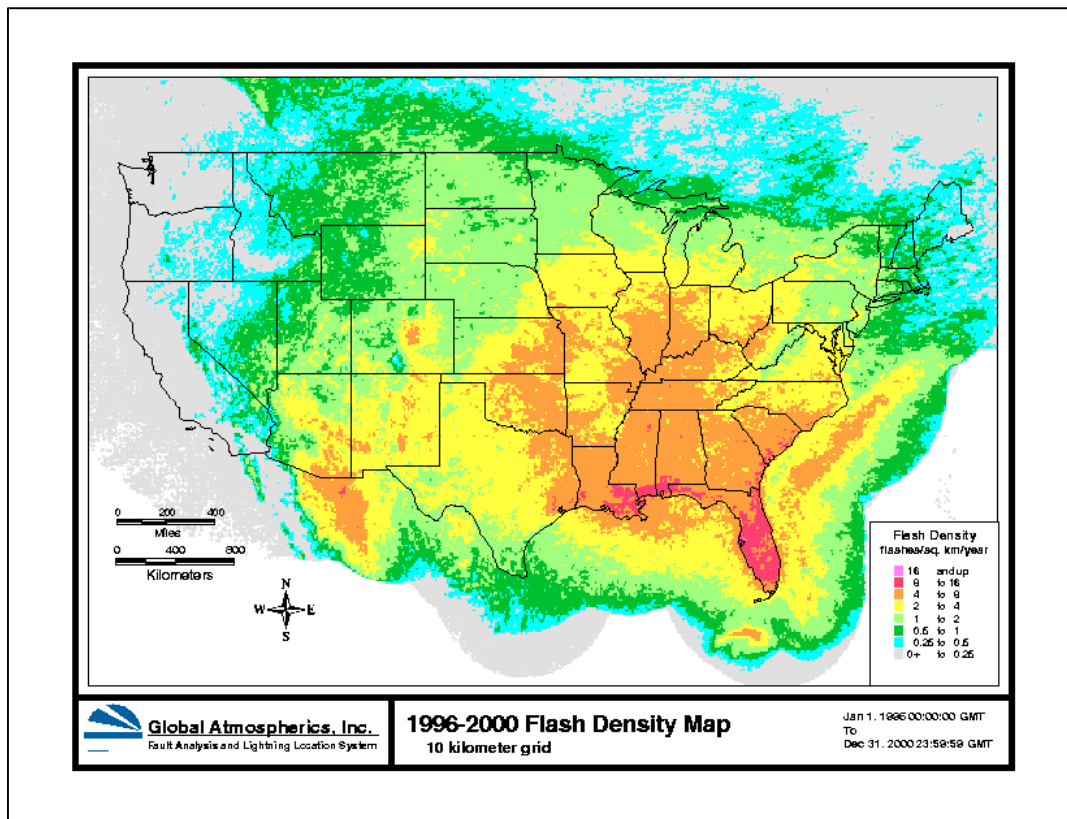
<b>Fire and Explosion Risk Mitigation Plan</b>		
<b>C / O</b>	<b>Potential Fire or</b>	<b>Mitigation Measures</b>

<b>Fire and Explosion Risk Mitigation Plan</b>		
<b>*</b>	<b>Explosion Source</b>	
C & O	General Fire Protection	<ul style="list-style-type: none"> <li>• All on-site service vehicles fitted with fire extinguishers</li> <li>• Fire station boxes with shovels, water tank sprayers, etc. installed at multiple locations on-site along roadways during summer fire season</li> <li>• Minimum of 1 water truck with sprayers must be present on each turbine string road with construction activities during fire season</li> </ul>
C & O	Dry vegetation in contact with hot exhaust catalytic converters under vehicles	<ul style="list-style-type: none"> <li>• No gas powered vehicles allowed outside of graveled areas</li> <li>• Mainly diesel vehicles (i.e. w/o catalytic converters) used on site</li> <li>• Use of high clearance vehicles on site if used off-road</li> </ul>
C & O	Smoking	<ul style="list-style-type: none"> <li>• Restricted to designated areas (outdoor gravel covered areas)</li> </ul>
C	Explosives used during blasting for excavation work	<ul style="list-style-type: none"> <li>• Only state licensed explosive specialist contractors are allowed to perform this work – explosives require special detonation equipment with safety lockouts</li> <li>• Clear vegetation from the general footprint area surrounding the excavation zone to be blasted</li> <li>• Standby water spray trucks and fire suppression equipment to be present during blasting activities</li> </ul>
<u>C &amp; O</u>	<u>Electrical fires</u>	<ul style="list-style-type: none"> <li>• <u>All equipment is designed to meet NEC and NFPA standards.</u></li> <li>• <u>Graveled areas with no vegetation surrounding substation, fused switch risers on overhead pole line, junction boxes and pad switches.</u></li> <li>• <u>Fire suppressing, rock filled oil containment trough around substation transformer.</u></li> </ul>
C & O	Lightning	<ul style="list-style-type: none"> <li>• Specially engineered lightning protection and grounding systems used at wind turbines and at substation</li> <li>• Footprint areas around turbines and substation are graveled with no vegetation</li> </ul>
C	Portable Generators – hot exhaust	<ul style="list-style-type: none"> <li>• Generators not allowed to operate on open grass areas</li> <li>• All portable generators to be fitted with spark arrestors on exhaust system</li> </ul>
C	Torches or field welding on-site	<ul style="list-style-type: none"> <li>• Immediate surrounding area will be wetted with water sprayer</li> <li>• Fire suppression equipment to be present at location of welder/torch activity</li> </ul>

Fire and Explosion Risk Mitigation Plan		
C & O	Electrical arcing	<ul style="list-style-type: none"> <li>Electrical designs and construction specifications meet or exceed requirements of NEC and NFPA</li> </ul>
* Indicates risk during construction (C) and/or operations (O)		

#### Section 4.1.2, Risk of Fire or Explosion

Lightning is rare in the area. As shown in the flash density map below, the Kittitas Valley and interior Washington in general, are not highly lightning prone areas. In fact, this area falls in the second lowest of eight categories of lightning intensity. The map is based on data from lightning flash sensors installed nation-wide over a four-year period.



## **Other EIS Safety Issues (e.g. fire, tower collapse, blade throw, blade icing, EMF, etc.) Raised in Scoping Process**

There is no single agency or entity that is responsible for tracking these issues nationally or internationally. One very useful source of information on the risks associated with operating wind Projects is the insurance industry. The Applicant contacted Worldlink Insurance in Palm Springs, CA to gain comparative information regarding the types and degree of risk associated with wind power Projects. Worldlink stated that they insures over 12,000 turbines comprising over 3,400 MW of capacity, and that principals at the company had 15 years of experience with the wind industry. They stated that They were not aware of any tubular wind tower structure collapsing. They also stated that fires from wind turbines were very rare, averaging approximately two to three incidents per year among the 12,000 turbines insured by the company. This translates into a rate of one fire per 4,000 to 6,000 turbines. Worldlink also noted that the vast majority, approximately 85-90%, of those fires were related to older (i.e. pre-1995) wind turbine technology. Perhaps most importantly, they stated that the firm had only one third-party claim ever, which was for a haystack that burned on a neighbor's property as a result of a fire related to an older wind Project in Altamont, CA. Applicant is not aware of any documented collapse of a tubular tower wind turbine. Turbines and towers are designed to strict standards in order to withstand extreme weather events. As described above, Applicant proposes setbacks of at least the height of the tower plus the blade (overall tip-height) from any county or state roads and residences, as a further safety measure.

### Electromagnetic Fields (EMF)

EMF is associated with electric transmission and is not specific to wind power Projects. Electromagnetic fields are only ever considered a possible issue when associated with the siting of high voltage (115kV+) overhead transmission lines in close proximity to residences. It is not an issue related to wind turbines, which have low voltage drop-cables (575 – 690V) contained within steel towers and have a predominately underground collection system also at a low voltage (34.5 kV), all of which is located more than 1,000 feet from non-participating residences. High voltage transmission lines will be designed and built according to industry standards to avoid any potential EMF impacts

### Icing

While ice buildup on blades is an occasional problem for wind turbines in terms of lost energy production, flying ice is not. When ice builds up on the blades, they turn very slowly (at only several revolutions per minute) until the ice is shed. This is because the airfoil has been compromised by the ice, and the blades are unable to pick up any speed<sup>1</sup>. It is important to note that while more than 55,000 wind turbine generators have been installed world-wide, there has been no reported injury from ice thrown from wind

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<sup>1</sup> [www.awea.org/faq/sagrillo/ms\\_zoning4.html](http://www.awea.org/faq/sagrillo/ms_zoning4.html)



turbines.<sup>2</sup> Studies of long-term weather data for the area by the Applicant's consulting meteorologist indicate that icing conditions occur on average 3 to 5 days per year<sup>3</sup>. This is categorized as a 'Moderate icing' risk according to the 'Wind Energy in Cold Climates' (WECO) study commissioned by the European Union's Environment Directorate.<sup>4</sup> Reported data on ice throws<sup>5</sup> indicates that ice fragments were found on the ground from 15 to 100 meters (50-328 feet) from turbines and were in the range of 0.1 to 1 kg in mass. In order to prevent ice from causing any potential danger, the turbines at the Kittitas Valley Wind Power Project will be located at least 1,000 feet from any residences (see response to Comment 24 under Section 2.3). For additional safety, selected turbines rows within 328 feet of public roads will also be equipped with a fail-safe dual sensor detection icing system, which will shut the turbines down and activate a local alarm during rare icing events. The affected machine(s) will remain dormant until icing conditions are no longer present.

Blade throw (i.e., blade fragments thrown from a rotating machine)

The wind turbines proposed for the Project meet international engineering design and manufacturing safety standards. This includes tower, blade and generator design. There is an international quality control assurance program for turbines, and a number of relevant safety and design standards.

In addition, foundation design and commissioning checks address potential failure due to extreme events such as earthquakes or extreme wind loadings, as well as frequency tuning of the different parts of the structure to avoid failure due to dynamic resonance.

International experience to date has indicated very low risks associated with tower collapse, components falling from towers, and blade throw<sup>6</sup>. Despite the very rare destruction of a wind turbine, no member of the public has ever been killed injured by a wind turbine<sup>7</sup> other than a parachutist in Germany who jumped into one. Risks have been continually reduced as turbine technology has improved. Publications such as *Wind*

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<sup>2</sup> Morgan, C., Bossanyi, E., Seifert, H., [Assesment of safety risks arising from wind turbine icing \(pdf\)](#), Proceeding of the International Conference, Wind Energy Production in Cold Climate, BOREAS IV, held at Hetta, Finland, 31 March - 2 April 1998, Published by: Finnish Meteorological Institute.

<sup>3</sup> Please see Attachment 5 which contains an icing conditions estimate for the Project area prepared by consulting meteorologist Ron Nierenberg.

<sup>4</sup> The "Wind Energy in Cold Climates (WECO)" Study was part-funded under contract JOR3-CT95-0014 of the Non-Nuclear Energy Programme managed by the European Commission, DGXII, and by the UK Department of Trade and Industry. This Project was co-ordinated by the Finnish Meteorological Institute with DEWI (D), Garrad Hassan (UK), Risø (DK) and VTT (FI) as contractors. The WECO study was conducted to establish a set of guidelines for dealing with potential dangers arising from ice thrown off wind turbines.

<sup>5</sup> Morgan, C., Bossanyi, et al, 1998.

<sup>6</sup> 'Energy Wise Renewables: Guidelines for Renewable Energy Developments', Energy Efficiency and Conservation Authority, 1995

<sup>7</sup> Paul Gipe, [Wind Energy Comes of Age](#), pg 361, John Wiley & Sons, New York, 1995..

*Power Monthly* and *Wind Stats* provide current information on industrial accidents and failures of components.

#### Shadow Flicker

Shadow flicker, or strobe effects, can occur in houses only if the turbine is located in close proximity to a home and is in a position where the blades interfere with very low-angle sunlight. Typically however, the set-back distances required for noise mitigation are more than adequate to prevent interior occurrences of shadow flicker. Applicant has completed extensive modeling of potential shadow flicker at the Project site, please see Attachment 12 for a report and modeling results regarding shadow flicker from consultant Wind Engineers Inc.

#### Telecommunications

Applicant will repeat the telecommunications obstruction analysis if a turbine is selected which has a rotor diameter greater than 80 meters. If a tower interferes with an existing telecommunications path, mitigation could be achieved by simply moving the tower slightly to avoid obstructing the path.

#### ***Section 5.1.4.3.10, Interstate 90***

Text in section 5.1.4.3.10 of the Aesthetics and Light and Glare chapter of the Project's application recognizes and characterizes the Mountains to Sound Greenway:

The 100 mile segment of I-90 beginning at the Seattle waterfront and extending east to Thorp was designated as a National Scenic Byway by the Federal Highway Administration in 1998. This highway segment is also a part of the Mountains to Sound Greenway. The greenway, which consists of the corridor along I-90 from downtown Seattle to Thorp, is conceived of as a scenic, historic, and recreation corridor intended to function as a scenic gateway to the Seattle metropolitan area and a pathway to nature for the metropolitan area's population. The greenway concept has provided a framework within which the Mountains to Sound Greenway Trust, a private non-profit organization and state and federal agencies have been able to plan and implement measures to acquire, protect, and develop lands along the corridor that provide recreational opportunities and/or protect natural, historic, and scenic resources.

At the time the Project was being planned, a representative of the Applicant met with representatives of the Mountains to Sound Greenway Trust and the Trust's Kittitas County Caucus. At that meeting, the Project was described, the Project alternatives being considered were reviewed, and feedback from the Greenway Trust was received. The representatives of the Trust raised two issues. They expressed concerns (it is important to note that these were concerns, not objections) about the potential visibility from I-90 of the turbines, which at that time, were being proposed for locations on Lookout Mountain. They also requested that the Applicant consider using brown paint on the turbines (similar to the brown paint that WDOT uses on bridges in this area) to make them blend in with their surroundings. Subsequent to this meeting, and in part in response to the concerns expressed by the Greenway Trust, the alternative that entailed placement of turbines on Lookout Mountain was dropped from consideration. Because of the Mountain to Sound Trust's interest in the use of brown paint for the turbines, several simulations were produced depicting the appearance of turbines with a brown finish in several landscape situations (Figures Vis 5c and Vis 17c). As indicated in the discussion in section 5.1.4.7 of the ASC comparison of simulations of towers with a neutral gray finish with simulations of towers with an earth-tone brown finish (Simulation Views 2 and 14) indicate that although the earth tone finish reduces visual contrast in views in which the turbines are seen against a landscape backdrop, it accentuates the visibility of the turbines in views in which they are seen against the sky. Because the turbines are most frequently seen against the sky, particularly in close range views where visual concerns are the greatest, the gray finish is the better choice for minimizing Project aesthetic impacts.

The Aesthetics and Light and Glare analysis devotes specific attention to assessment of the Project's effects on views from I-90; from the community of Thorp, which is a point of interest at the eastern end of the greenway; and from the John Wayne Trail, which is one of the greenway's important recreational features. These areas are described

in ASC sections 5.1.4.3.10, 5.1.4.3.7, and 5.1.4.3.8 of the analysis and the Project's potential aesthetic impacts on these areas area assessed in ASC section 5.1.4.5.

The Wenatchee National Forest encompasses 2.2 million acres along a 135 mile segment of the eastern front of the Cascade Mountains in the area extending from Lake Chelan on the north to the area around Rimrock Lake on the south. In the Project area, the National Forest encompasses the lands on the slopes of Table Mountain to the north and east of the Project site. Although Table Mountain has relatively few developed recreational facilities, it is a popular place for valley residents to go for winter sports, hiking, camping, picknicking, and other recreational activities. The primary access from the valley into the Table Mountain area is via Reecer Creek Road, which at the Forest boundary, becomes National Forest Primary Route 35. Where Route 35 begins at the southern Forest boundary, it first passes up a steep slope by means of series of sharp switchbacks. At the top of this slope, the road enters a forested area that is relatively flat, and where side roads branch off into areas appropriate for recreational use. The best known feature on Table Mountain is Lion Rock, which is located about 5.25 miles north of the Forest's southern boundary. Lion Rock's attraction is the panoramic view that it offers toward the mountains to the north. Lion Rock is located approximately 6.75 mile northeast of the Project site, and because of the intervening trees and topography, the Project site is not visible from this viewpoint.

The National Forest lands closest to the Project site are those in Section 25, which is located to the northeast of the large lot residential subdivision in Section 35 at the upper end of the private Elk Springs Road. This portion of the National Forest is located a little over 1 mile from turbine H1, which would be the closest Project feature. Because most of the land in Section 25 slopes into the canyon along First Creek, the Project area is potentially visible only from a small area of ridge along the Forest's southern boundary line. Here, the actual visibility is highly restricted by the heavy forest cover that exists in this area and on the lands to the south of it. This area's accessibility is limited, and it contains no developed recreational facilities. The closest area of the Forest from which the Project area is potentially visible and in which there would be more than a handful of viewers is Section 33 of Township 20 North, Range 18 East where National Forest Primary Route 35 starts to switchback up the slopes of Table Mountain. In this area, the landscape is generally open, and the Project site is visible in middleground and foreground areas 3.25 to 6.5 miles to the southwest. In views from this area, because of the distance, and because the turbines would be seen against a backdrop of scrub and grassland, the Project's degree of visual contrast with the landscape would be relatively low. Because of the steep slopes in Section 33, and the absence of pullouts, the lands in this area are not generally a recreational destination; instead, this area functions more as a travel corridor to the forests and meadows on the plateau above, which are more suitable for recreation. In the plateau areas to the north where the recreation takes place, views to the southwest toward the Project site are generally screened by trees, so the Project's visibility to recreational viewers would be very limited. Because of the Project's distance from areas of the Forest used for recreation, its limited visibility from these areas, and its

high degree of visual absorption in any views that might be available from this area, its impacts on recreational users on Forest lands will be very low.

#### ***Section 5.1.4, Aesthetics***

In preparing the Aesthetics, Light and Glare analysis that was submitted as a part of the Application for Site Certification (ASC), use was made of a map that displayed the boundaries of all existing parcels in the Project area. In addition, based on analysis of maps, air photos, field work, and interviews with local residents, a map was prepared that showed the locations of all dwellings in the Project area. This information is reflected in the characterizations of existing conditions in the Project area presented in ASC Section 5.1.4.3 and in the detailed area-by-area assessments of visual impacts presented in ASC Table 5.1.4-3. Based on field observations and conversations with knowledgeable residents of the area, it appears that most existing dwellings in the Project area are used as full-time residences, and that the majority of the small parcels that are still vacant are in areas like the Ellensburg Ranches subdivision located in the area to the west of Highway 97 near the Bonneville Power transmission corridor which appears to be geared for full-time rural residential occupancy. The primary exception to this generalization is the area in the ridge lands lying east of Highway 97 that are described in ASC Section 5.1.4.3.2. This portion of the analysis makes reference to Section 35 of Township 20 North, Range 17 East, which is located at the upper end of a locked private way known as Elk Springs Road and which has been divided into 32 lots ranging from 10 to 60 acres in size. Because of the nature of this area's parcelization and physical features, and because of its difficult access and distance from services, Section 35 is the one place in the Project area where the existing pattern of residential occupancy involves a mix of full-time and second home use. The breakdown of how properties in that area are currently being used is presented in ASC section 5.1.4.3.2. The effects of the Project on views from this area are identified in ASC Tables 5.1.4-2 and 5.1.4-3.

In assessing how the properties in Section 35 would be affected by the Project, it is important to observe, as was noted in the analyses in ASC section 5.1.4.3.2 and in ASC Tables 5.1.4-2 and 5.1.4-3, that the closest turbines would be 0.9 mile or further from the properties in Section 35, and that from many of the properties, the turbines would not be visible, or would be substantially screened by trees and/or intervening topography. Although the Project will transform the appearance of the area lying between Highway 97 and Section 35, primarily by adding the strings of tall turbines, it will keep this area in use as open space and grazing land for the life of the Project, and will preclude this area from being subdivided like the area on the west side of Highway 97 in the Ellensburg Ranches area and being converted into a rural residential landscape, which, with its higher levels of human activity, traffic, lighting and noise, and higher numbers of domestic animals, could be less conducive to continuing recreational use of properties in Section 35 than the proposed wind farm.

Figure A in Attachment 11 is a view looking north from Highway 97 from a point just south of Bettas Road that takes in a view of the area in which the proposed Operations and Maintenance (O&M) facility, and the substation connecting to the Puget Sound Energy transmission line would be developed. Figure B in Attachment 11 is a simulation that depicts this view as it would appear with development of the O&M facility and substation. The depiction of these facilities includes a number of the visual mitigation measures that are an integral part of the Project proposal. These measures include:

- Use of low-reflectivity earth-tone colors for the O&M facility structures to integrate them into the surrounding landscape;
- Use of a low-reflectivity gray color for the equipment in the substation to minimize visual salience;
- For the asphalt and gravel areas around the O&M facility and substation, selection of materials with colors that will not contrast with the site's soil colors;
- For the chain link fencing that will surround the substations, a dulled, darkened finish will be used to reduce their contrast with the surroundings.

One of the mitigation measures that the simulation does not depict is the planned establishment of naturalistic groupings of indigenous vegetation in the area between the O&M facility and substation and Highway 97. At the time the Project is built and this vegetation is put in place, the additional vegetation will provide further screening of these facilities as viewed from Highway 97 and Bettas Road.

Although the presence of the O&M facility and substation, and the cut in the hillside required to accommodate them constitute a visible change in this view, the new elements do not dominate the view and do not substantially change the view's overall level of visual quality.

Data from turbine manufacturers indicates that the turbine towers and nacelles will be coated with a semi-gloss material and that the two products available for this purpose have gloss ratings between 70% and 75%.

In evaluating the potential effects of the aviation navigation lighting required by the FAA, factors to keep in mind are that under the current FAA regulations, the navigation lights need to be mounted on the first and last turbine of each string and every 1,000 to 1,400 feet on the turbines in between. The FAA is now reviewing modifications to these requirements which would, if adopted, substantially reduce the total numbers of lights required. The navigation lights flash white during the day at 20,000 candela and red at night at 2,000 candela. The navigational lights are designed to tightly concentrate the beam in the horizontal plane, thus minimizing the diffusion of light down toward the ground and up toward the sky.

Because the navigational lights will be mounted on top of the nacelles, it can be assumed that the elevation of these lights will be approximately 225 feet above the ground. As a consequence, in most situations, the navigational lights will be located well above any

nearby residences, eliminating the potential for the navigational lights to direct beams of light into homes.

The only scenario where this might be an issue is where homes close to the Project are located upslope from the turbines, creating the potential that the homes could be at the same general elevation as the navigational lights. The only place where this situation might exist is in the lower portion of Section 35 (which contains three properties, only two of which have structures on them) at the upper end of Elk Springs Road, which is located upslope from the Project. The closest turbines to Section 35 are those in Stings G and H. It is important to note that most homes in Section 35 are surrounded by fairly dense forest, thus limiting the potential for FAA lights to be a problem.

The turbine closest to Section 35 is Turbine H1, which is approximately one half mile from the closest upslope residence. Review of the site layout on a topographic map indicates that the base of this turbine is at an elevation of approximately 2,960 feet; the aviation warning light that would be affixed to the top of this turbine's nacelle would be at an elevation of approximately 3,185 feet. Because most of the residences in Section 35 that are located on the slope that faces in the direction of the Project are sited at elevations that range from 3,200 to 3,600 feet in elevation, they are located above the plane in which this light's beam would be concentrated, and as a result would not be likely to experience substantial impacts related to it. The exception to this is that there is a single residence in the southeast quadrant of Section 35 that is sited at an elevation of a little under 3,200 feet from which the direct beam of the navigational light might be visible, assuming there are no screening effects from trees or other obstructions. An additional variable to consider in evaluating if and/or the extent to which this property would be affected by the navigational light is its distance from the light, which would be 0.5 mile away. Because String H travels downslope from turbine H1, any other navigational lights mounted on turbines in this string would be further away from Section 35 and at even lower elevations, further reducing the potential for direct impact on residences in this area.

The turbine in String G that is closest to Section 35 is Turbine G1, which is located approximately 0.5 mile from the closest Section 35 residence. The base of this turbine is at an elevation of approximately 3,140 feet, which would place the warning light on top of its nacelle at an elevation of approximately 3,365 feet. Further south along String H, navigational lights would be mounted at elevations of approximately 3,055 feet, 3,175 feet, 2,125 feet, and 3,075 feet. There are approximately 8 residences in Section 35 which are located at elevations close to the elevations at which they would be in the direct beam of the navigational lights mounted on turbines in String G, in the worst case scenario. However, the dense forest in Section 35 likely would screen the lights from many if not most residences in this area, and that not all the residences are oriented toward the proposed turbine locations. These residences are located at distances ranging from 0.5 mile to 1.5 mile from turbines on which the navigational lights are mounted.

### ***Section 5.1.6, Historical & Cultural Preservation***

According to Franklin and Dryness (1988:217), the Project area lies within the *Artemisia tridentata*/*Agropyron spicatum* association of the shrub-steppe vegetation environmental zone. This zone occupies the center of the Columbia Basin Province and extends west to the foothills of the Cascade Range. Because the pedestrian survey was conducted during October, it was difficult to identify many plant species at that time. However, vegetation observed on the higher elevations of the Project area includes desert buckwheat (*Erigonum*), dwarf goldenweed (*Haplopappus acaulis*), cushion phlox (*Phlox hoodii*), rock penstemon (*Penstemon gairdneri*) and low grasses. The higher elevations are situated within lithosols or regoliths, thus the sediments are extremely rocky. Vegetation observed on the lower elevations of the Project area includes bitterbrush (*Purshia tridentata*) and arrow-leaf balsamroot (*Balsamorhize sagittata*) and various grasses. For a detailed discussion of the vegetation of the Project area, see ASC Section 3.4 Plants and Animals and ASC Exhibit 8. The list of vascular plant species in ASC Exhibit 8 contains well over 60 plant names identified by Hunn (1990) as having Sahaptin plant names. Hunn further classified many of those plants, such as lomatium and cow-parsnip, as food plants. Lomatium is harvested using a digging stick in the early spring. Plants alone do not constitute an archaeological site, however, their presence can be used as an indicator that the area could have been used as a place to gather food.

Microcrystalline (cherts and most chalcedonies) and cryptocrystalline (opal) toolstone materials were few in the surveyed area, and were deposited only as alluvial nodules. Exposed elements of the Ellensburg Formation were not observed. Thus, if toolstone materials are not available, prehistoric knappers did not access the area to quarry/collect flakeable materials. For a detailed discussion concerning the geology of the Project area, see ASC Section 3.1 and ASC Exhibit 6.

### **ETHNOHISTORY**

As mentioned above, the Project area is situated within the Yakama Nation ceded territory. The Kittitas Indians are one of five closely related, but independent, bands that today make up the Yakama Nation. The Kittitas lived, generally, in the Yakima River valley drainage from Selah Creek (south of Ellensburg), north to the area near Keechelus Lake (at Snoqualmie Pass). This area is often referred to as the Kittitas Valley.

As part of the Plateau cultural group, the Kittitas utilized a riverine settlement pattern, based upon sharing of diverse resources among bands of related and extended family groups. Beginning in April with root gathering—before the spring Chinook run at the Dalles—they followed a subsistence cycle referred to as the seasonal round, traveling to and from resource procurement grounds. Through spring, summer and fall, they gathered and processed various foods contained within the surrounding areas, including camas, bitterroot, lomatium and other roots, berries, fish, deer, elk and medicinal herbs and other plants and animals (Hunn 1990).



Celilo Falls and The Dalles, great fishing and trading centers, were located down river on the Columbia. Celilo Falls was the principal fishing area for the whole region. There were many other Columbia River fisheries all up and down the river—one at Priest Rapids, for example. Trading and fishing at The Dalles attracted not only the Kittitas, but people from as far away as the Northwest Coast, with trade items available from the Great Plains and Northern California. The Kittitas followed the trails from the Upper Yakima River through Union Gap and on south to Celilo. Other fisheries utilized by the Kittitas during the summer and early fall were located to the northwest at the outlets of Lakes Cle Elum, Keechelus, and Kachess—Lake Cle Elum being the largest (Schuster 1990). In addition, fishing sites are found along the entire length of the Yakima River, and it is likely that campsites along many stretches in the Kittitas Valley were used for plant gathering and processing as well (DePuydt 1990).

During ethnographic times, the Kittitas maintained close ties to both Sahaptin and Salish-speaking tribes (Ray 1936, Prater 1981, Miller and Lentz 2002), particularly the Wenatchee and Snoqualmie. The Kittitas were expert traders and maintained particularly strong trade relations with the Snoqualmie, and were known to winter with them at their village below Snoqualmie Falls (Prater 1981).

The Kittitas resided all along the upper Yakima River from near Cle Elum Lake to the Yakima Canyon. There were at least eleven known Kittitas villages located in this portion of the Yakima River valley. (See Figure 3 for those close to the Project area). Most were near the Yakima River, and the others were near creeks flowing into the Yakima River (Schuster 1998; Ray 1936). Camas could be dug by the village (tia' nawins) located at the mouth of the Teanaway River, also known as a gathering place to trade, gamble, play games and race horses (Schuster 1975). A Kittitas village (ti'plas), with a population of approximately 50 people, was located at the mouth of Swauk Creek. This is approximately 2 kilometers (1.2 mile) west of the Project proposed turbine string B. Another (kla'la) was located approximately the same distance south of the Project proposed turbine string C, opposite the mouth of Taneum Creek.

Many trails (Figure 3) dotted the local landscape, connecting the villages located at the head of Yakima Canyon with the area west of the Cascades. Ray (1936) reported several Indian trails in the Kittitas Valley. One, in particular, followed Reecer Creek and crossed to Swauk Creek about four kilometers (2.5 miles) northeast of proposed turbine strings G and C in the Project area. Another followed the southern banks of the Upper Yakima River west to the upper reaches of the Cle Elum River. Trails extended north from the Yakima River trail into the mountains and to Wenatchee. Another crossed from the mouth of Naneum Creek to Reecer Canyon and then over to Swauk Creek well above the proposed Project area. Portions of present-day Interstate 90 (Prater 1981) west of Thorp were literally constructed over the ancient Indian trail leading westward across the mountains via Snoqualmie Pass. In addition, the Kittitas and other Yakima used Naches Pass to reach Puget Sound to trade at Fort Nisqually (Glauert and Kunz 1976).

The horse arrived in the Kittitas Valley around 1740, after being traded by the Shoshone to other Plateau Indians and then to the Kittitas. With the resulting increase in mobility, they could then travel greater distances, often to the Great Plains in pursuit of buffalo or to intertribal trade centers and social gatherings. Indians enjoyed competition in horsemanship. Skill in handling became a source of prestige. Status measurements changed and wealth was counted in horses, which thrived on upland grasses of the Plateau. Plateau people were thus influenced by the plains culture and adopted many of their practices, such as dress, dancing style, housing style, decorative beaded horse garments, European trade goods, and changes in inheritance patterns (Meinig 1968, Schuster 1990). Even so, riverine environments remained important and most groups retained their previous subsistence customs. Although horses and European trade items were acquired in the early part of the 18<sup>th</sup> century, actual European-American contact began with the Lewis and Clark Expedition in fall 1805, well south of the Project area.

## HISTORY

Euro-American influence in the Kittitas Valley began with early explorers. British fur traders for the North West Company, such as David Thompson and Alexander Henry the Younger, descended the Columbia past the junction of the Yakima River in the summer of 1811 and fall of 1813, respectively. Alexander Ross was the first known Euro-American to enter the Kittitas Valley to the east of the Project area in 1814. Fur traders and trappers, both American and British, soon followed. For example, Charles Wilkes met with the Kittitas Indians near present-day Ellensburg in 1841 (Schuster 1998).

The Kittitas Valley, as part of the Oregon Territory, was governed under joint occupancy between the British and Americans until 1846. After that time Anglo settlements increased throughout the region. Catholic missions were established in the Yakima River Valley in 1847 (Schuster 1982) at the invitation of Ow-hi (Ricard 1976). Most missions were located a distance away from the Project area at Ahtanum and on Manastash Creek (Glauert and Kunz 1976). There was possibly one, however, at the mouth of the Taneum on the Yakima River (Olmstead-Smith in Miller and Lentz 2002). Few, if any, adult Indians were baptized or attended mass on a regular basis (Ricard 1976). However, the Catholic fathers had an excellent relationship with the Indians, particularly Kamiakin, Ow-hi and Te-i-as. Father Pandosy often served as an interpreter and trusted counsel for them during negotiations with the United States Government (Glauert and Kunz 1976). Tensions and fears were high throughout the region after the deadly attack on the Whitman Mission near Walla Walla. In addition, the Protestant settlers did not trust the Catholic Priests. Once hostilities broke out in the open in 1855, the Catholic mission at Ahtanum was sacked and burned by vigilantes (Hunn 1990, Schuster 1982).

The relative isolation of the Yakima Valley began to disintegrate in the 1850s as events proceeded rapidly. The Donation Land Act was passed and Indian lands in the Northwest were opened for settlement. White settlers began moving into areas on both sides of the mountains. Washington Territory was formed in 1853 and Isaac Stevens was appointed governor and Indian agent. Besides surveying a railroad route across the territory, Stevens's primary motivation was to gain legal and undisputed title to Indian land so

settlement could proceed unobstructed (Hunn 1990). At Stevens's direction, Captain George B. McClellan conducted a preliminary survey to construct a wagon trail over Naches Pass and surveyed the Kittitas Valley.

It was McClellan who first introduced the word "Kittitas" into the geographic lexicon, though it was later misspelled by Stevens's staff when they drew the maps. McClellan reported that his base camp was at Kittitas, the name of a nearby Indian encampment. In addition, the priest, Father Pandosy had baptized his first convert at that location and spelled it in his records as "Ki-tatash". Many meanings have been ascribed to the name, but the early frontiersman, Charles Splawn said that *kittit* means white chalk and *tash* means place of existence. There is a bank of such chalk on the Yakima River just south of Ellensburg. The chalk was used by the Indians to paint their faces and their horses (Glauert and Kunz 1976).

Also in 1853, James Longmire brought the first wagon train of settlers through the territory and across Naches Pass to the Puget Sound region (Glauert and Kunz 1976, Schuster 1982). McClellan discovered gold in the Kittitas Valley in 1853, but no one paid much attention until larger mines were discovered in the Colville area in 1855. Tensions increased as miners rushed to cross through the Upper Yakima to reach the Colville, precipitating a closure of the area by military order. Despite that, soldiers continued to look for gold, eventually discovering several nuggets on the Peshastin (Glauert and Kunz 1976).

As a result of these events, Plateau bands began moving towards unification and confederation though they did not quite succeed. Yakima tribal leadership began to emerge through Ow-hi and Te-i-was of the Upper Yakima and their nephews Kamiakin, Showaway and Skloom of the Lower Yakima (Schuster 1982). In the fall of 1854, Kamiakin called a council of all tribal groups on middle Plateau to meet at the Grand Ronde in Eastern Oregon. The purpose was to form a confederacy and organize resistance, but no agreement could be reached (Meinig 1968).

Once the treaty negotiation process started, Governor Stevens was relentless in pursuit of his goals. He organized a series of grand treaty councils to be held at various locations around the territory. In June 1855, approximately 1,000 Yakimas led by Kamiakin, Ow-hi and Skloom along with other Plateau groups attended negotiations at the Walla Walla treaty grounds, at a place where they had often gathered in the past to trade. In return for ceding their territories, Indians were promised payment in goods, cash and other compensation and exclusive rights to bounded areas called reservations. In reality, their traditional ties were severed and they were denied access to hunting territories and resource procurement areas (Hunn 1990, Schuster 1982).

After lengthy discussions and negotiations in which most Indians just gave up so they could go home (Schuster 1990), the treaty was signed at Walla Walla on June 9, 1855. It established a formal relationship between the U.S. government and the Yakima people. The treaty created the Consolidated Tribes and Bands of the Yakima Nation, now the

Yakama Nation. Inadvertently, this formal relationship served to bind together formerly politically autonomous local bands—the Kittitas, Wanapum, Yakama, Taitnapam, and Klickitat—into a nation with a formal sense of tribal unity (Schuster 1982). Together they ceded almost 11 million acres (29,000 square miles) more than one fourth of the State of Washington, and were moved to the reservation at present-day Toppenish (Schuster 1998). In lieu of those lands, they retained approximately 1,200,000 acres (2,000 square miles) of land for their “exclusive use and benefit”. No white man was permitted to reside on the reservation without permission of the tribe (Hunn 1990). This proved not to be the case.

Within months after the signing of the treaties, Stevens announced that the territory was once again open for settlement. A veritable land rush began. The discovery of gold on the Colville further increased tensions as miners swarmed across the landscape. In September, some Yakimas attacked a group of trespassing miners who had molested Yakima women (Schuster 1990). When the Indian agent came from The Dalles to investigate, he was attacked and killed by Showaway’s son. Soldiers sent to avenge the agent’s death were attacked and routed at Toppenish Creek by Kamiakin. Full-scale warfare resulted. In November the Oregon Mounted Volunteers, in pursuit of the Yakima out of Union Gap, looted and burned the Catholic Mission at Ahtanum (Glauert and Kunz 1976, Schuster 1982).

Colonel George Wright constructed a fort on the Naches and a base camp in the Kittitas Valley as a show of force, believing that the Indians would be persuaded to negotiate for peace. Even though he met with Ow-hi, no settlement could be reached. Wright then rounded up about 400 Kittitas and Wenatchee and transported them to Fort Simcoe to keep them away from other, more hostile bands. Hostilities continued throughout the Washington Territory until about September 1856. But in 1858, gold was again discovered, this time in British Columbia. Yet another group of miners was attacked while trespassing in Yakima lands. Lt. Jesse Allen retaliated and attacked a village at dawn in the Teanaway-Swauk area, killing three Indians. Lt. Allen also lost his life by friendly fire (Glauert and Kunz 1976). The War in 1858 continued until a final surrender in September. Ow-hi turned himself in. His son, Qualchon was hanged in the mistaken belief that he was responsible for the earlier death of the Indian agent. Ow-hi was killed while trying to escape. Skloom did not regain his lost prestige. Kamiakin fled to Canada where he lived to be 73 (Schuster 1990). But, the will of the Indians was finally broken and they were gradually moved onto their reservations.

Congress ratified the treaty on March 8, 1859, and settlement of the Kittitas Valley continued. By the 1860s, cattle were being driven from the Yakima valley to the mines in Canada, and open range became the norm for the Columbia Plateau. Ranchers in the Kittitas Valley followed the example set earlier by Ow-hi and Kamiakin and took advantage of the abundant grass for feed. The area around Thorp was the most active ranching locale in the Kittitas valley by the end of the decade, and homesteading as well as ranching began to increase. After the Snoqualmie Wagon Road was completed in

1867, ranchers in the Kittitas Valley began to use it to drive cattle to Puget Sound (Prater 1981).

Frederick Ludi and John Goller were the first permanent white settlers in the Kittitas Valley. They came from Montana Territory in 1867. Tillman Houser was the first settler to come into the Kittitas Valley from Puget Sound. He built a cabin for his family and planted wheat in 1868 north of present-day Ellensburg, then returned to the Sound to get his wife and children via the new Snoqualmie Wagon road. Fielding Mortimer Thorp and his father-in-law Charles Splawn soon followed from east of Yakima (Prater 1981). They raised a herd of Durhams (Glauert and Kunz 1976). They homesteaded at the mouth of Taneum Creek, near present-day Interstate 90 and the ancient Kittitas village site—a few miles south of the proposed Project area. Thorp and Splawn opened a small trading post and started the first mail route over Snoqualmie Pass, paying an Indian named Washington \$10 per round trip delivery. The first school in the Kittitas Valley was started by Charles Splawn. The first students were local Kittitas Indians (Prater 1981). The mill and granary at Thorp opened in 1883 and was in operation until 1946. The Thorp Mill is on the National Register of Historic Places (Kirk and Alexander 1990).

No account of the history of the Kittitas Valley can go without mention of Robbers Roost, the trading post established in 1870 by Charles Splawn's brother Andrew Jackson Splawn and Ben Burch, who Splawn later bought out (Prater 1981). They got their supplies from The Dalles and traded mostly with the local Indians and drovers on their way over Snoqualmie Pass because there were not many white families yet in the area. John Shoudy purchased Robbers Roost one year later and platted the town of Ellensburg (Kirk and Alexander 1990).

Placer mining began in the Swauk Creek area in 1873. The center of the mining district was at Liberty, once called Meaghersville, the center of a small gold rush. Chinese workers were hired for \$2 to \$3 a day, but were driven out of the area by about 1884. Most claims were north of Liberty and well north of the Project area (Glauert and Kunz 1976).

In 1887, the Northern Pacific Railroad was completed from the Kittitas Valley through Stampede Pass and onto Tacoma, a definite advantage for Ellensburg as the headquarters for the Cascade Division. This provided an opportunity to exploit the timber and coal resources along the route. Ellensburg became somewhat of a hub for transportation of goods to Wenatchee and the surrounding areas and could then provide supplies to markets in Puget Sound (Meinig 1968). Hundreds of men were employed to cut and lay timber for railroad ties (Prater 1981) and later bridges across the Columbia River. The population of Ellensburg doubled from 600 to 1,200 in two years after completion of the railroad (Kirk and Alexander 1990, Oliphant 1976).

Lumber was also provided for the ever-increasing number of settlers' homes in the Kittitas Valley. Logging took place in the areas west and north of the Project site. The land around the Project area is too dry to support trees. Sawmills were established in the

Kittitas Valley as early as the 1870's and the annual spring log drives continued until 1915, transporting logs from upland sources to the mills below in Ellensburg and Yakima. The drive was a site to see. Schools and even businesses closed during this spectacular event, so that everyone could go down to the river and watch. Once the dams were completed at the lake outlets near Snoqualmie Pass, restricting spring run-off, the logs could no longer be floated in the Yakima River. Also, more bridges and more irrigation canals were constructed along the way, further inhibiting access. Once railroad lines were connected from high mountain logging areas to the Northern Pacific Railroad, floating was no longer necessary (Henderson 1990). Logging today is still an economic resource for upland areas and mills in the area.

However, once the railroad was complete, the Snoqualmie Wagon Road was used less and less as a conduit for cattle. The construction of the railroad stimulated settlement of the Kittitas Valley and other areas of eastern Washington. Farming was on the increase and cattle was no longer king. However, improvements continued on the Snoqualmie Wagon Road until the dawning of the age of the automobile. Through continuous use over the years, the road has evolved into what it is today, a major east-west thoroughfare connecting the Kittitas Valley with Puget Sound and all parts east.

Once the automobile was introduced, large-scale changes began to occur in the transportation system. Supported by federal highway legislation and funding, state road construction increased dramatically. Portions of old trails and wagon roads were gradually superceded. The Ellensburg to Cle Elum Road one day became U.S. Highway 97. The Snoqualmie Wagon Road is now Interstate 90, and the wagon road from Ellensburg to Yakima through the canyon is now Canyon Road.

Interest in large-scale irrigation began as early as 1892 in the Kittitas Valley. Preliminary surveys were conducted by the U.S. Reclamation Service in 1905. The first Projects, however, were constructed in the lower Yakima River Valley. Construction didn't begin in the upper valley until about 20 years later. The Kittitas Reclamation District organized in 1911 so that landowners could secure financing. Water was to come from the reservoirs at Kachess and Keechelus Lakes. World War I put a stop to plans until the federal government finally provided assistance beginning in 1925. A tunnel for the North Branch Canal is located just south of the southern portions of the Project turbine string B. This canal is a branch of the Kittitas Reclamation District Main Canal irrigation system, constructed between 1926 and 1932. The water intake is on the south bank of the Yakima River just above Easton. The water from this canal irrigates approximately 2,830 acres in the vicinity of Badger Pocket southeast of Ellensburg. The OAHF inventoried this irrigation system in 1985 (Soderberg 1985).

Hydroelectric dams on the Columbia River were constructed in the 1940s and 1950s. These dams transformed the once raging river into a series of slack-water lakes and monumental power plants to provide irrigation and electricity to the homes and business of the Pacific Northwest. In spite of the great benefits, there have been many losses, particularly to native fisheries. Irrigation put an end to open stock ranges, though farming

became progressively more important. The command center at Wanapum Dam, the nearest to the Project area, is connected by computer to all other dams on the Columbia and tracks by the day how much water is released and held behind each dam. An average of 6.5 million gallons of water per minute pass through its turbines to manufacture electricity to be used as far away as Los Angeles. Bonneville Power Administration transmission lines bisect the Project and the whole of the Kittitas Valley, delivering power from dams on the Columbia (Rocky Reach, Wanapum, and Grand Coulee) to Western Washington.

Re: GLO Map, 1874

Specifically concerning the Project area, the U.S. Department of Interior, General Land Office (GLO 1874), surveyed Township 19 North, Range 17 East in 1874 (Figure 4). The surveyor noted a trail in the NE of Section 22 and the E½ of Section 16. The trail in Section 16 was located just to the west of the proposed Project String D. The GLO trail area in Section 16 was crossed at least three times when surveying for the underground electrical and the existing access road. No visual traces of these trails were noted. The GLO trail in Section 22 was located west of and at a lower elevation than the proposed Project String E. No evidence of the previous trail was noted by the current survey in Section 22.

Re: GLO Map, 1892

Township 20 North, Range 17 East, was surveyed by the GLO much later—in 1892 (GLO 1892). This survey reflected an increase in Euroamerican activities. Several roads within the township were labeled as “wagon roads to timber” (GLO 1892). By then, the road from Ellensburg to Cle Elum was in place. This road crossed the western half of Section 34, with an apparent timber road leading from there to the northeast through Section 27. Much later, the Ellensburg to Cle Elum Road came to be called State Highway 97. These roads are located in the W½ of Section 34, outside the present survey area. The GLO surveyor reported “no timber or brush” near the southern section line of Section 34. The surveyor additionally noted a cattle trail course running NW & SE in Section 34. All GLO road and trail segments are situated outside the Project area. According to OAHF files, segments of old trails or historic roads in the vicinity of the Project have not been recorded or evaluated for national register significance.

Even though remaining segments of the GLO-mapped trail were not noted by the current pedestrian survey, it is evident that native peoples utilized areas surrounding the proposed Project turbine strings and auxiliary roads and power lines in the past. These trails could have been used to gain access to root gathering places or to travel from the Kittitas Valley to the mountains in the north and west.

Re: EWU, 1990 Survey

No prehistoric or historic archaeological sites were recorded in the Project vicinity as a result of this survey.

Re: Bicchieri, 1994 Survey

A lithic scatter was recorded adjacent to an intermittent drainage.

Re: HRA, 1996 Survey

HRA, Inc recorded one lithic isolate, three historic-period sites and 61 historic-period isolates on the pipeline route. These artifacts or sites were not located within the proposed Project area.

Re: HRA, 1998 Survey

The surveyor found only a few historic can fragments that were too small for identification. No culturally modified lithic material was found.

*Table 1. Summary of recorded archaeological sites within 1.2 miles of Project area.*

Site Number	Legal	Quad	Site Type
45KT350	Sec 27, T20N, R17E	Swauk Prairie	Prehistoric, lithic scatter
45KT368	Section 5, T19N, R17E	Swauk Prairie	Historic, two log cabins w/RR assoc.
45KT545	Section 2, T18N, R17E	Swauk Prairie	Prehistoric lithic scatter, campsite
45KT1754	Section 24, T19N, R17E	Thorp	Prehistoric, lithic scatter, campsite
45KT2182	Section 20, T19N, R17E	Thorp	Historic, irrigation pumping equipment
45KT2183	Section 38, T19N, R17E	Thorp	Historic, railroad shack
19-223	Section 20, T19N, R17E	Swauk Prairie	Historic structure

None of these archaeological sites have been determined eligible for inclusion in the National Register of Historic Places (NRHP), nor has there been a request made for an OAHF Determination of Eligibility. The prehistoric sites are generally associated with alluvial flats or terraces. The historic sites, with varying settings, are generally associated with historic construction such as railroad or irrigation systems. Within the Project area, we would expect to find historic sites in similar associations in a wide variety of locales, while prehistoric sites would most likely to be found associated with springs.



Traditional Cultural Properties (TCPs) are a historic property type recognized under the National Historic Preservation Act. Two criteria for TCPs include:

- “a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;” and
- “a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice” (National Register Bulletin 38).

The literature search revealed no recorded TCPs within the Project area or vicinity. Plants found on the Project area indicate that the land could have been used for plant resource procurement, but the Project area has not been specifically documented as such.

#### North Branch Canal

The North Branch Canal has not been determined eligible for inclusion in the National Register of Historic Places (NRHP), nor has there been a request made for an OAHP Determination of Eligibility. There are several canals, storage dams and ditches in Kittitas County that have been determined eligible, but none are now listed on the National Register. In 1999, Chapman and Fagan surveyed the irrigation features in Kittitas and Yakima Counties within the Area of Potential Effect (APE) for the Proposed Level 3 Fiber Optic Line Project. A total of 19 large, named irrigation canals were included, but the North Branch Canal was not part of this survey. Chapman and Fagan recommended that the major canal crossings, smaller ditches, and their associated irrigation features were potentially eligible to be included in the NRHP, though no formal determination has been made to date. They recommended that the features be avoided, or repaired and replaced in-kind during construction of the fiber optic line.

The Project Turbine Strings C and D are situated on the ridge above the North Branch Canal tunnel, but not the exposed canal. In addition, the proposed Project will not be using the North Branch Canal road during construction. Project access and road upgrades will be made via Hayward Road in Sections 16 and 20. No impact will be made upon the North Branch Canal or the canal road.

#### Toolstone Materials

The lack of any quantity of high quality toolstone materials in the Project area precludes prehistoric “lithic procurement” sites as well as most other sites resulting from flaked

stone reduction activities. Most likely, prehistoric knappers found an occasional nodule of useable toolstone material on the surface, tested that material (possibly creating a small prospect site, although these sites were not identified in the Project area), and either rejected the tested nodule, or transported the nodule to some other location for reduction. Most toolstone materials were most likely brought into the Project area. The general rule in lithic technology is that it takes useable, conchoidally-fracturing toolstone materials to manufacture flaked stone tools. Simply put—no stone, no procurement sites.

## ***Section 5.2, Transportation***

There are no significant operational impacts on the transportation system as a result of the Project. No LOS standard is reported for arterials in the objectives stated in Kittitas County Comprehensive Plan section 4.8, Goals, Policies, and Objectives. In addition, a review of the Comprehensive Plan identified no other transportation-related goals, policies, and objectives that directly relate to the kinds of transportation impacts the Project may have. There is no stated LOS standard for arterial mainline segments and the impacts of the Project are consistent with the goals and policies of the Comprehensive Plan.

### ***Section 5.2.1, Existing Conditions***

The traffic volumes are not seven years old; as noted on ASC Table 5.2.1-1, the most current WSDOT data (2001) were used. New traffic counts are not proposed to be taken. Traffic data from 1997 were used to develop a historic growth trend. In response to this comment, a very conservative k-factor of 15% was also tested with the existing traffic volumes on US 97 and Kittitas County-owned roadways. The LOS for these locations were not affected by a higher peak hour volume. Rick Holmstrom of WSDOT (April 7, 2003) reported that there are no operational problems at exit 106 (to US 97).

There is no record of WSDOT collision data after the year 1997, according to this statement from the WSDOT web site: “Due to delays in implementing a new collision records system in the state, the most recent year covered by this report is 1996.” Please refer to ASC section 5.2.1.6.

The Applicant has been working with Washington State Department of Transportation (WSDOT) and has met on-site with Rick Holmstrom of WSDOT to review site access ways and their site distances. As a result of this field review Applicant is considering relocating the proposed entryway to G-row (an existing driveway on US Hwy 97) to a location with better site distances in both directions just west of turbine location G-17 on US Hwy 97.

Measures taken to increase visibility during construction include: clearly marked Project site access ways, use of flaggers, and appropriate signage near access ways for traffic from both directions. Furthermore, all wide, heavy and slow vehicles will be appropriately marked and oversized transport vehicles will be accompanied by pilot cars.

### Section 5.3, Public Services & Utilities

The facilities listed represent an exhaustive listing of recreational areas in Kittitas County. The Applicant has attempted to provide a thorough list of public facilities available for recreational purposes. Distances are provided in the revised table below.

<b>Parks, Recreational Facilities, and Activities within 25 Miles of the Kittitas Valley Wind Power Project Facility</b>			
<b>Distance (Miles)</b>	<b>Facility</b>	<b>Distance (Miles)</b>	<b>Facility</b>
<b>Ellensburg City/Community Parks/Campgrounds</b>			
13	Burlington Northern Square	13	Reed Park
14	Catherine Park	13	Rotary Pavilion
14	Irene Rinehart Riverfront Park	15	Sagebrush Trail
13	Kiwanis Park	13	South Main Entry Park
14	Lions/Mountain View Park	13	West Ellensburg Park
13	McElroy Park	14	Whitney Park
13	Memorial Park	14	Wippel Park
15	Paul Rogers Wildlife Habitat Park	13	Skate Park
12	KOA Campground (private campground)		
<b>Ellensburg Museums</b>			
13	Children's Activity Museum	16	Olmstead Place State Park and Heritage Center
13	Clymer Museum and Gallery	6	Thorp Mill (located in Thorp)
13	Kittitas County Museum		
<b>Cle Elum/Roslyn City/Community Parks/Campgrounds</b>			
15	Cle Elum City Park	15	Whispering Pines (private campground)
15	South Cle Elum City Park	5	Trailer Corral (private campground)
20	Roslyn City Park		
<b>Cle Elum/Roslyn Museums</b>			

**Parks, Recreational Facilities, and Activities within 25 Miles of the Kittitas Valley Wind Power Project Facility**

<b>Distance (Miles)</b>	<b>Facility</b>	<b>Distance (Miles)</b>	<b>Facility</b>
15	Carpenter Museum	25	Salmon La Sac Guard Station
15	Cle Elum Historical Telephone Museum	15	South Cle Elum Depot Restoration
20	Roslyn Museum		
<b>State Parks</b>			
16	Olmstead Place State Park	15	Squilchuck State Park
40	Ginkgo State Park (no camping)	32	Lake Easton State Park
40	Wanapum State Park	1	Iron Horse State Park (no camping)
10	LT Murray Wildlife Area		
<b>U.S. Forest Service (Okanogan and Wenatchee National Forests)</b>			
30	Crystal Springs	8	Mineral Springs
28	Kachess	15	Swauk
30	Owhi	12	Ken Wilcox at Haney Meadows
40	Fish Lake	8	Lion Rock
25	Salmon La Sac	8	Taneum
30	Cayuse	12	Icewater
25	Red Mountain	15	Taneum Junction
25	Cle Elum River	40	South Fork Meadow
20	Wish Poosh	12	Tamarack Spring
20	De Roux	20	Riders Camp
17	Beverly	17	Manastash
8	Red Top	21	Quartz Mountain

#### ***Section 5.3.3.7, Communications***

Applicant is not aware of any documented evidence whatsoever that wind turbines and/or towers interfere in any way with cellular phone service or coverage. Maintenance personnel at wind farms routinely use both cell phones and two-way radios when they are out among the turbines for communicating with other staff on and off site. In areas of the US with very large numbers of turbines and high densities of turbines, such as Altamont, Tehachapi and Palm Springs in California, no problems have been reported with cell phone service. In fact, in Germany and elsewhere, cell phone antennae are being installed on the very same towers as wind turbine generators. The fact that cellular phone service providers have not raised concerns or objections about proposed or operating wind farms is also a good indication that such interference is not considered a problem.